



**SPACE  
2010**

CONFERENCE  
& EXPOSITION

**Panel on Future Satellite Operations**  
**Session 122-OPS-6**  
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**NASA Goddard Space Flight Center's  
Participation in  
Joint SatOPS Compatibility Efforts**

**Dan Smith**

NASA Goddard Space Flight Center  
[Dan.Smith@nasa.gov](mailto:Dan.Smith@nasa.gov)



# Introduction



- ◆ Many U.S. government organizations build or fly space systems:
  - ❖ NASA, NOAA, Navy, Air Force, NRO, ORS. Others?
  - ❖ Through the Joint SatOps Compatibility Committee (JSCC) and our “Compatible Sat C2” efforts we have increased the grass-roots interaction between many of these organizations
  
- ◆ We all deal with many of the same challenges
  - ❖ More rapid deployments, lower budgets
  - ❖ Advancing technologies – frameworks, clouds, virtualization
  - ❖ Evolving concepts – automation, situational awareness, enterprise mngt.
  - ❖ Standardization – formal or by common use
  
- ◆ “There is an inherently governmental role in creating the business case for contractors and commercial product vendors to move in directions beneficial to multiple government space organizations.”

# Mission Operations System Themes



## ◆ Out

- ❖ “one-off “ solutions
- ❖ 100% homegrown
- ❖ One size fits all
- ❖ Each mission on its own

## ◆ In

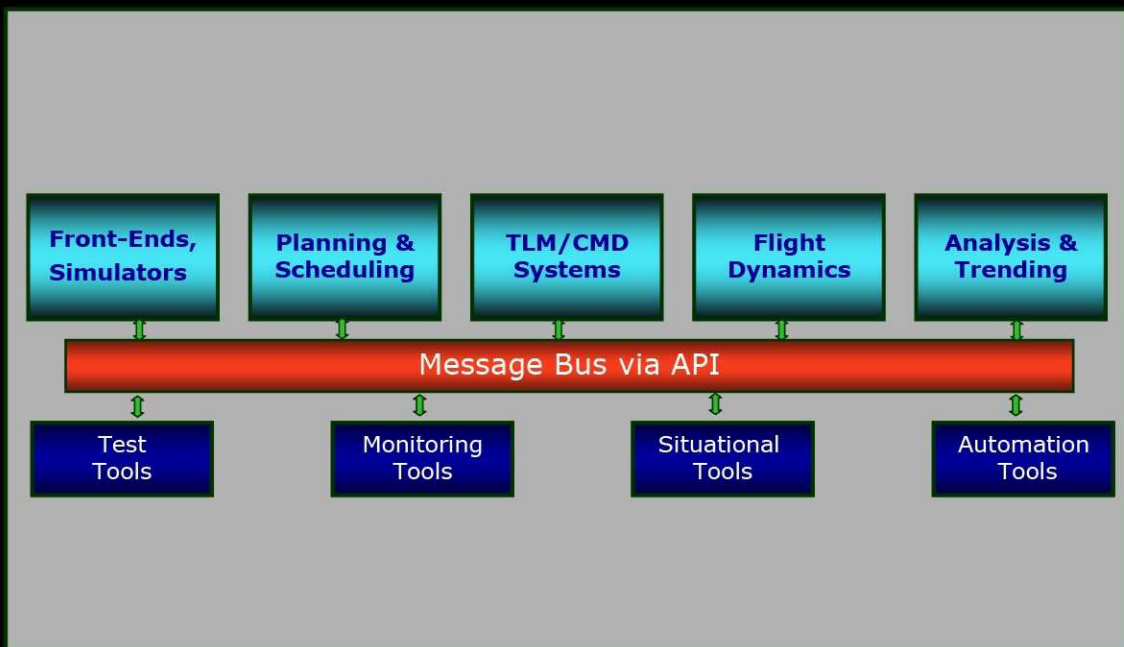
- ❖ Increased use of commercial products
- ❖ Frameworks to simplify integration
- ❖ User choices and standards
- ❖ Common/compatible interfaces
- ❖ Software component reuse
- ❖ Collaboration across NASA and beyond
- ❖ Move towards a mission operations enterprise
- ❖ Increased automation and situational awareness



# NASA/GSFC's "GMSEC" Architecture



**MSFC**



Avtec Systems



DesignAMERICA



The Goddard Mission Systems Evolution Center (GMSEC) provides a publish/subscribe framework to enable rapid integration of commercially available satellite control products.



# NASA/GSFC's Compatible C2 Efforts (1 of 2)

- ◆ Regular interaction across the different government organizations
  - ❖ Active development support in collaboration with both the ORS and AF
  - ❖ Regularly host different external organizations' visits
  - ❖ A cross-agency network of ground system experts has been formed
  
- ◆ Continued development of the GMSEC framework
  - ❖ Proof of concept labs running at other JSCC locations
  - ❖ NASA continues to fund basic system development and maintenance
    - ✦ Introduced IBM's Websphere as a pub/sub communications bus
    - ✦ Adding local environmental monitoring (temp/humidity, etc.)
  - ❖ Collaborations started for GMSEC core enhancements
    - ✦ Enterprise communications
    - ✦ Security / Information Assurance
    - ✦ NDDS as a pub/sub communications bus

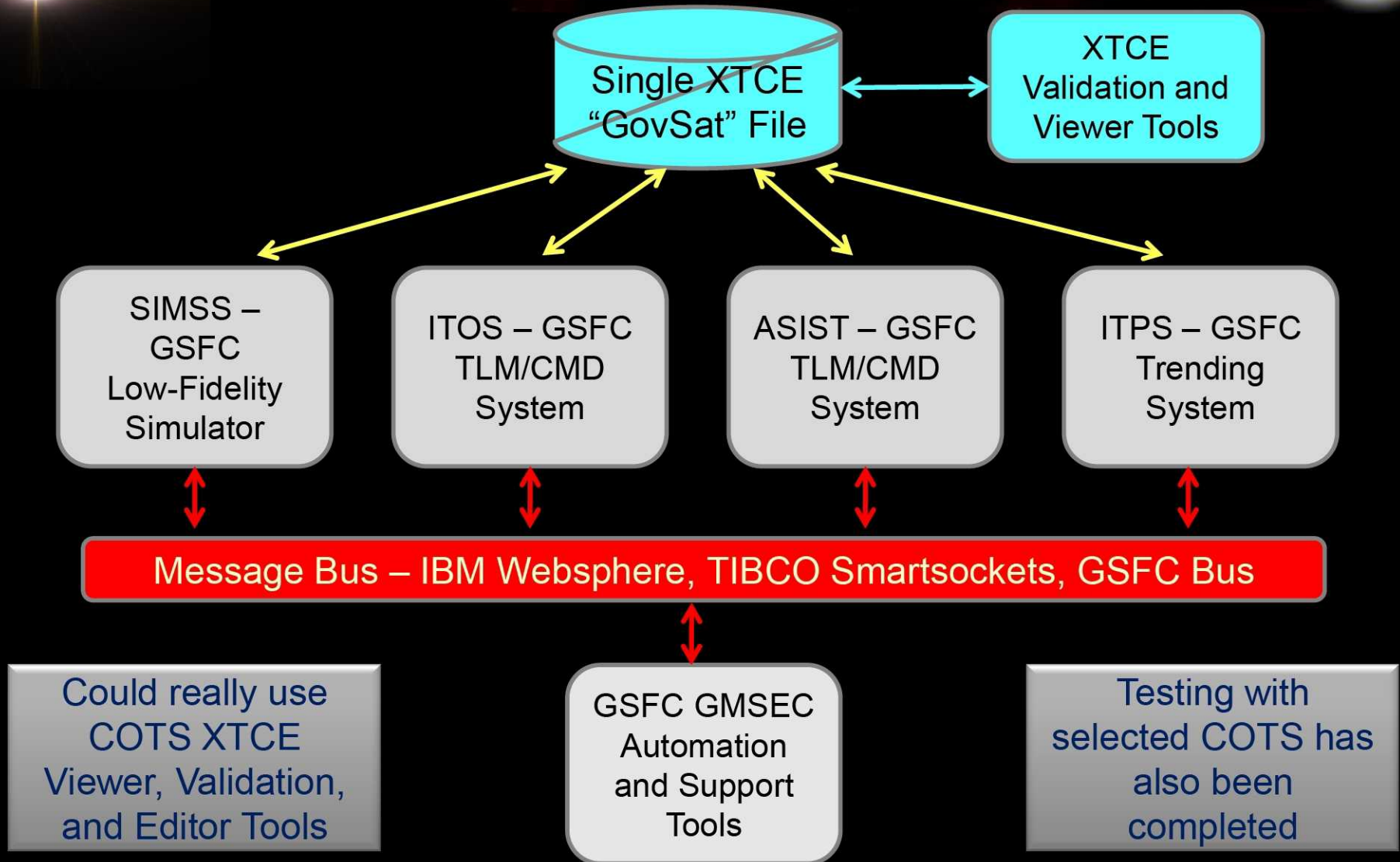


# NASA/GSFC's Compatible C2 Efforts (2 of 2)



- ◆ Pushed for the adoption of XTCE for TLM/CMD list definitions
  - ❖ Developed “GovSat” – a tailored XTCE subset for CCSDS missions
    - ✦ Documented limited set of XTCE-compliant capabilities and approaches
    - ✦ Added field constraints
  - ❖ Modified GSFC-internal products to utilize XTCE definitions
  - ❖ Encouraged use of XTCE for upcoming missions
    - ✦ Missions at several NASA Centers now considering XTCE
    - ✦ ORS and Naval Research Labs have now tested with XTCE
  
- ◆ NASA promotes the expanded use of existing CCSDS standards
  - ❖ Packetized telemetry and command data
  - ❖ XTCE
  - ❖ Consideration of evolving Spacecraft Monitor and Control standard

# NASA/GSFC XTCE “GovSat” Validation Test



# Now What?



- ◆ We believe in the value of the JSCC
  - ❖ Let's keep it going as a broad forum
  
- ◆ Let's focus on common challenges
  - ❖ Enterprise level situational awareness
  - ❖ Security
  - ❖ Increased use of inter-agency sharing and COTS
  - ❖ Industry participation and consistency
  
- ◆ Continue to emphasize benefits of standards
  - ❖ CCSDS packetized data
  - ❖ XTCE
  - ❖ Delay/Disruption Tolerant Networking (DTN)